

Ouverture de ‘Design Management, Product Engineering and Global Competition’*

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Abstract

Product design defines the functions that qualify a product or service, in order to identify and organise the distinctive specifications of the company offer, and to develop goods and services based on analysis of the needs of demand (customer satisfaction). The first imperative for global corporations is, indeed, to deliver value to empowered customers (market-driven management).

For global corporations, achieving a differential advantage in terms of product design therefore means designing an offer based on the best interpretation of corporate imitation and innovation processes

Keywords: Product Design; Design Management; Product Engineering; Chief Customer Officer; Chief Marketing Officer; Customers Empowerment

1. Overture

For global corporations, achieving a differential advantage in terms of product design means to develop a product based on the best interpretation of specific distinctive characteristics. For this purpose, information must be collected in continuum from the market, referred to customers and competitors, to understand the targets and to predict the future actions, even monitoring the threat of new competitors and any eventual replacement products, i.e. products that meet specific consumer needs in a different way or at a lower cost (Brondoni 2014; Lambin, Brondoni 2001).

In particular, global markets express a new vision of corporate researches, consistent with the information needs of complex organisations (generally network-based) working with several decision-making points (characterised by high-level of autonomy and responsibility) and with very brief action-reaction times (Koo, Cooper 2011; Brondoni, 2010).

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2. The Role of Design in the Management of New Product Development

The process of developing new products always contains elements of uncertainty. This uncertainty translates into a significant risk for companies investing in the development of new products or services, because substantial resources are often committed at an early stage of projects that may or may not succeed.

Product development is generally understood as a cyclic process, composed of sequential stages. Within each stage, there are sub-processes which are themselves cyclical and iterative (Thota and Munir 2011). Developing new products requires substantial iteration, and iteration requires time. This time pressure squeezes all phases of the process, but industrial design is disproportionately affected, leaving less time for the vital “front-end” activities of user-based research and insight that make valuable innovation possible and make product development worth doing in the first place. (Cagan and Vogel, 2013).

The value-generating activities at the front-end of an industrial design process, in contrast, rely on interpersonal activities that are very difficult to time-compress, such as observational research, iterative prototyping and interviews. Now, however, the situation has changed again. This change can be understood as a convergence of trends, one that redefines how the product development process is understood, and how designers participate in the process.

This approach raises the necessity for new methods of management, abstracted from the social sciences that may give effective answers to the enterprises and, consequently, to the consumers. Design management should be positioned in the centre of strategic action within the enterprises, since the development of new products and services is a continuous and cyclic process of making strategic decisions.

The role of design has shifted considerably over the past few years. Design is now being recognized as a key business asset that can add significant value to business performance (Press and Cooper, 2003; Kristensen and Gronhaug, 2007). Traditionally, design was perceived mainly as visual appearance, aesthetics, external form of a product. In recent years, however, we can observe increased interest in design in a much broader sense as a tool to support the creation of innovation, building strong brand, or even the strategy throughout the organization (Martin, 2009; Verganti, 2006, 2009). That led to growing attention in design management as an important business specialization, because, as Bruce and Bessant (2002) put it: “Good design does not happen by accident, but rather as the result of a managed process”. Borja de Mozota (2003) stresses that design is based on exploration and risk-taking, whilst management is founded on control and predictability, thus design management can present significant challenge to many organizations. So, dynamic design management is concerned with the development of (new) knowledge, (new) design competences, and capabilities rather than project management of design projects. A process of product development, innovation, or even marketing can become “an engine of renewal” (Bowen et al. 1994; Danneels, 2002) building and expanding organizational competences over time. These processes might even trigger a change in an organisation’s market domain.

Design has received increasing attention by researchers exploring in the management of New Product Development (NPD). Kristensen (1998) suggests that design should be institutionalized into the firm’s strategic orientation, and that the

firm's core values be infused by design ideas; while Perks et al. (2005) emphasises that design should be seen as process leader throughout the NPD process. Roper et al. (2012) discovered that companies where NPD displays design-leadership characteristics have better economic performance. These studies represent the increasing importance of design in NPD and suggest companies develop new product by implementing design-oriented NPD.

3. From Product to Business Model through Design Management

This emergent paradigm penetrates all areas of action, especially the business organizations and their models of management. As a consequence, the focus has shifted from the product to the business model, or rather to the elements surrounding the core offer of innovating companies. Game-changing and academic contributions (Keeley et al., 2013) have convincingly evidenced not only the importance of creating customer value, but also the seamless integration of entrepreneurial action on the one hand and disciplined innovation and design management on the other which characterize high innovation performers over time. As Osterwalder (2012) said "business model innovation is about creating value for company, customer and society. It about replacing outdated models". Practitioners need to start putting the innovation accent not only on the features and functionalities of the offer but also in the business model that encases the product or service.

Literature about business model innovation is generally lacking; specifically, there is a gap relative to this topic in industries characterized by different a logic that of fast-paced technology industries. Furthermore, if design-driven innovation is a concept that has widely permeated the management literature (Verganti, 2009; Noble and Kumar, 2008; Ravasi and Stigliani, 2012), there is a neglected area of research where design management studies meet business logic and the relevant business models.

In design-intensive industries, products are more or less open narratives in which customers are involved in defining the product sense and meaning. Thus the customer does not play the ordinary role of receiver but acts sometimes as "sense giver", some others as a co-designer, till to be a full "maker". (Brondoni, 2005)

Moreover the creation of product meaning seems not to be delegated to the tangible product in itself, but to the entire business model that companies run and to the ways in which customers are engaged in it (Rieple et al. , 2012).

In consideration of the new paradigm and defined knowledge as the driving force of the new social structure, the necessary changes within the enterprises and the management, including design management, should be determined, both in their structures and in their dynamics.

The organizations always had used and exploited knowledge for the realization of their objectives, although it seems that they suddenly became aware of the need to define and instrumentalize ways to manage that intangible asset.

A transformation of information intensive organizations is produced by means of the intelligent use of information and information technologies with the aim of being more competitive. Analyses of the most advanced organizations seem to indicate that what makes an organization successful is the intelligent management

of information and knowledge. This includes having people on-board who know how to develop methods, processes and cultural forms, thereby permitting the combination of the input information from the environment with the information generated in the interior in pursuit of the final aim of innovation and generating differential knowledge. Such organizations also know how to project information of their activities towards the environment (Davenport and Prusak, 1998). Thus, the described environment, loaded with uncertainty and complexity, requires the determination of flexible and adaptable strategies.

The analysis strengthens the existence of a clear analogy between strategy and design, considering that they are operating in a similar way when they intervene in order to solve a problem of quite a complex situation. Both have the need to provide all the information concerning the nature of the problem which is to be solved, permitting them to plan and arrange a project. On the other hand, the development of products and services, as an essential element of business dynamics, is a consequence of the strategic action. Making business decisions on products and services, determines the actual strategy of the organization; likewise, the generation and management of information, which is to be converted into knowledge, efficiently guides the decision-making process with reference to the products and services.

In more concrete terms, the development of the products is an interminable and cyclical activity within the business dynamics; therefore, innovation, the creation of values and knowledge management can only be considered as processes requiring continuity.

A new approach for the generation of product ideas will be to mark and envision future scenarios, in which the products will be re-enrolled, including the reality of the future market, the technological tendencies, and the needs of the potential and future consumer.

Design management must be involved in the processes of knowledge management, since the development of products and services cannot be understood in isolation from the creation of new knowledge and innovations. Concentrating on design management, we have to revise its role in relation to the development of products and services. In fact, when there is not yet a general agreement on the definition of design, the value of the design within the development of products and services has been transformed, specifically the structure on which those approaches and dynamics are based.

The integration of the design function for the benefit of the overall performance of the organization is a crucial issue that has been awarded a considerable amount of attention. Design is an integrative discipline and design ought to be viewed as a “knowledge creating, generation and integration activity” (Hobday et al., 2012), not just as problem solving.

In the new knowledge society, the design manager, who is responsible for the development of new products and services, must transform his or her activities into knowledge-intensive and the generation new ideas from and for the future. The new professionals have to base their activities on predictions and assumptions, and not only on facts. They have to position themselves as the main and empathetic interpreter of what the end consumer will need, with a focus on the human being, thereby showing the will and capacity to understand and interpret the signs that are transmitted by the end consumer. These activities must be performed concurrently

with bearing in mind the technical feasibility and commercial viability of the organizations.

These statements transfer the activity of developing products and services to the centre of an enterprise's strategic formulation, with the design management being primarily strategic. The development of products and services becomes a continuous and constant process of effective and informed decision-making, that is to say, the determination of a strategy. In fact, decisions about new products affect every single area of decision-making. Thus, product decisions should be closely coordinated with all of the other business activities.

The entrepreneurial mode of design management also emphasises two dimensions essential for any creative enterprise: the dimension of design as a creator of new opportunities and the dimension of design management as a driver of the exploitation of these opportunities. These two dimensions can be applied with a view to new forms of creative entrepreneurship and intra-preneurship—to escape the inertia of established companies or to create a new form of capitalism. Today, there is in fact a visible trend towards more creative entrepreneurship (Nussbaum, 2013).

Design may consequently be seen as integrating across “needs” and “meanings”, while design management is the managerial capability to make use of design as a strategic resource, and consequential decisions and actions. Design management is the effective deployment by line managers of the design resources available to an organization in the pursuance of its objectives. It is therefore directly concerned with the organisational place of design, with the identification with specific design disciplines, which are relevant to the resolution of key management issues, and with the training of managers to use design effectively.

This new approach has to be based on future studies, and more precisely, on foresight as a discipline that can provide answers within the new context in which organizations are operating. The future of design management is elusive. Design is a constantly expanding beyond traditional disciplines, crossing boundaries moving and into new areas. At the same time design is managed at both macro (competitive arena, firms) and micro scales (products). While some see design crossing boundaries and moving away from its traditional domains and becoming the driver for expansive organisational change; others seek to develop better understandings of how design can act as a driver of innovation and feed product development.

4. Research for Design Empowerment in Global Competition

Traditional sources of information, such as market research and competitive benchmarking, are unfortunately too limited for taking strategic decisions in a global market space, because of the data explosion, social media diffusion and proliferation of channels and devices. These growing volume, velocity and variety of data push corporations to invest in new market and marketing research based on customer analytics, customer relationship management (CRM), social media and mobile applications that exploit the full power of the digital information. Today customers have immediate access to vast quantities of products and services, and in addition, the customers' experiences change rapidly and push firms to involve the customers in being part of the product design (Beuker, Abbing 2010).

Globalisation and digital communication technologies have been contributing to lead many markets into conditions of over-supply, i.e. with the consumption of certain goods no longer able to grow in line with quantities produced and/or imported, not even with falling prices.

The structural excess of production capacity leads to a situation in which operations have diminishing production direct costs. The situation has become even more critical by computer-based communications, which impose pressing work schedules on competitors (time-based competition) and produce: rapid imitation; accelerated technological innovation; global spread of innovation; and price slumps (Sung, Lu, Ho 2010). Under such conditions, long-term company growth depends not much on sales volumes or on the distinctive features of specific products (easily imitable in terms of tangible aspects and with intangible assets marked by extreme volatility in marketing costs), but rather on the degree of sophistication of corporate intangible assets (Brondoni 2002).

Since 1980s, when markets were not global yet, firms that were looking to send out a message to a large scale of population had only one policy, mostly using one-way mass communication. There was little, if any, direct communication between individual customers and the firm. Companies were just minded to push products and brands, and information about customers consisted primarily in aggregate sales statistics enriched by marketing research data (Abbing 2010).

In global markets, however, firms are customer-oriented and they are organised to satisfy customer segments with two-way communications.

As global companies shift their focus to customers, and customer information increasingly drives decisions, corporations must give less attention to current sales and product profitability and more to customer profitability and customer lifetime value. Despite large investments in acquiring customer data, most firms underutilise what they know whereas the increasing importance of customer information pushes companies to become adept at tracking information features (research for design empowerment) (Rust, Moorman, Bhalla 2010).

In global over-supplied markets, firms must interact directly with customers, and they radically reorganise the client-product relationship on specific objectives (design empowerment).. In a customer-centric firm the scope of market analysis shifts from an aggregate view to an individual view of customer activities. As a consequence, market research shifts its attention in acquiring the customer input that will drive improvements by customer-metrics focused on new product reflects real-world needs, the customer must be brought into the design process, integrating R&D and marketing to prototype new products and new features for existing products (Campbell et al. 2007).

Over-supplied markets emphasises the critical nature of research for design empowerment because the condition of excess of production presents strongly unstable demand (choices among different product classes and products with different uses; preference volatility; non-loyalty and disloyalty purchase behaviour) and unstable supply structures (planned innovation acceleration; production delocalisation; creation of demand bubbles) (Brondoni 2013). In over-supply competition, research for design empowerment maximises the opportunity to produce goods with specific features (derived from computer-based information) and meets customer expectations to satisfy specific demand bubbles.

Demand bubbles derive from an aggregation process (significantly different from a disaggregation process that results in segmentation in stable markets) that tends to create specific, highly unstable forms of demand (Corniani 2005). On the other hand, managing market instability presupposes the capacity for rapid development and exploitation of the demand bubble. This, in turn, imposes a continuous action aimed at identifying offers that follow one another over time and which are able to interest and satisfy groups of final consumers (Brondoni 2003)

Markets characterised by over-supply, therefore create competitive situations in which: space becomes a key factor in competition (market-space competition) and it is highly dynamic and unstable due to variability caused by continuous innovation in the range of available products or services, and by increasing selectivity of demand. Tangible aspects of supply and physical (administrative and geographical) limits do not determine market-space competition. On the contrary, competition is dominated by intangible aspects of supply and by virtual spatial coordinates (McDaniel, Gates 2002) that integrate and define the physical dimension (market-space management) (Brondoni 2002).

In general, manufacturer design empowerment gives preference to product features based on the speed with which they exit from the outlets (focusing more attention on product rotation than on margin of contribution, as happens for decisions about segmentation in stable markets).

In markets characterised by over-supply and by global competitive forces, research for design empowerment made by the producers– which constantly deal with consumption surplus and must act promptly to take advantage of demand bubbles– emphasises the critical nature of corporate information flow integration processes (outside, inside, and to/from co-makers), and, specifically, the importance of computer-based research (Brondoni 2003).

5. Global Product Design and Customers Empowerment

Global corporations are facing increasingly complex environments. Models for managing complexity are needed, and with its systemic approach, information design brings concrete answers to complexity management.

In discontinuous markets where digitalisation has produced a plethora of new products, customer experience is an effective instrument to create and manage the competitive product differentiation. Therefore customer experience is oriented to client profitability and will replace competitive differentiation through mere product features and product variants. So, value creation in mass markets is no longer produced into the companies, but is developed by interactions with the consumers.

Firms operating in mature markets have to invest considerably in researching valuable customer experience, even if it is more complex to design a product on an experience-basis than to develop a product on a market data-basis because more functions and points need to be taken into account. The costs of creating, developing, and then launching new products have risen tremendously (for example, the cost of developing a new drug, or launching a new fast moving consumer good into a distribution channel) (Brondoni 2012). Global imitation and shortening product life cycles mean that even great technologies no longer can be

relied upon to maintain a satisfactory profit before they become a commodity. The involvement of the customer in the design and production process is a strategy in which corporations are using Internet and computer technologies to innovate the products and to limit the R&D costs.

In global markets, chief marketing officers must find out who customers are, what they want and how they would like to interact with the organisation. Chief marketing officers are really unprepared to take charge of the growing volume, velocity and variety of data arising from the data explosion, proliferation of channels and devices, and shifting consumer demographics. CMOs are also underprepared to use customer analytics, customer relationship management (CRM), social media and mobile applications. When chief marketing officers rely on traditional sources of information, such as market research and competitive benchmarking, they are not able to make strategic decisions because these sources only show customers in aggregate, offering little insight into what individual customers need or desire.

In global corporation marketing departments tend to believe that the sales force is myopic -too focused on individual customer experiences, insufficiently aware of the larger market, and blind to the future landscapes. Sales departments, on the contrary, believe that marketers are out of touch with what's really going on in the marketplace (Kotler, Rackham, Krishnaswamy 2006).

The fundamental principle of product design based on experience (design empowerment) is therefore to think beyond the product and create meaningful interactions with customers of many countries who are the vital part of the experience (Borja De Mozota 1998). Compared to traditional new product development (NPD) research, the systemic view of experience design implies three major differences. The customer is seen as a co-creator and the product value is no longer created by the firm only, but in cooperation with the customer. While the product has been at the centre of NPD, design empowerment poses the product as the result of customer interactions.

□ *'Over the last decade, 'user experience' became a buzzword in the field of human-computer interaction (HCI) and interaction design. As technology matured, interactive products not only became more useful and usable, but also fashionable, fascinating things to desire. Driven by the impression that a narrow focus on interactive products as tools does not capture the variety and emerging aspects of technology use, practitioners and researchers alike seem to readily embrace the notion of user experience as a viable alternative to traditional HCI-Human-Computer Interaction' (Hassenzahl, Tractinsky 2006).*

In digital research for design empowerment, co-creation is not necessarily based on a company-customer relationship. Independent users can connect and presume content in pairs, groups or virtual communities (Reichwald, Bullinger 2008). In this case, the most famous example is the Linux community, in which co-creation goes beyond customer involvement as it is proposed by new product development research (customer-based idea generation and acceptance testing) (Gruner, Homburg 2000; von Hippel 1978).

Firms are looking for new ways to connect with their customers accelerating key business processes such as marketing, sales, supply chain and customer service, driving faster business results.

6. Chief Customer Officer, Chief Marketing Officer, Product Design and Global Customers Empowerment

Global companies transform operations centred on their customers re-engineering design processes to meet the preferences of their key-clients, focusing on specific means as computer intelligent-guided customer experiences, mobile-first business and the cloud computing (cloud computing encompasses many areas of tech, including software as a service; cloud computing services are all delivered over the Internet, on demand, from massive data centres).

Marketing departments and sales departments are both far away from R&D departments that must face global product imitation and innovation (Corniani 2012). On global market-space, the marketing department has to change in a customer department, and the *chief marketing officer* must be replaced by the *chief customer officer* that oversees customer-focused functions including CRM, customer service, marketing research, market research, and R&D with research for design empowerment.

Meeting customers' expectations requires insight, innovation and a system of engagement that delivers an intelligent guided customer experience. Firms design-driven have the ability to scan who is looking for what product features and make offers to customers to meet their preferences.

With social media interactions, and advanced analytics, corporations will project what global customers are looking for, instead of settling for what is available on the market. Sharpening analytics will help businesses across all industries anticipate and predict what customers want. Also social media is a key channel for engaging with customers. Social media has changed the role of both consumers and marketers, and the traditional marketing funnel has collapsed. Corporations now have immediate access to vast quantities of data concerning customers' expectations and interests. However, engaging with customers is not just about communicating with them. It is also about helping them enjoy the products and services they have bought. To do this, marketers need to look beyond the transaction and focus on the full customer relationship.

The intersection of technology (social media and analytics in marketing) and business transformation is driving systemic change in marketing. *Chief customer officers* are challenged by complexities related to new technologies, changing of consumer demographics, and growing quantities of data. They are also challenged as empowered customers -with access to more information than ever- are taking greater control of business relationships. The marketplace is moving faster than the marketing function.

Interacting effectively with customers in the digital era has implications beyond marketing products and services. With global interactions, the vision of designing, engineering and marketing to a universe of one is realised.

□ ‘RadioShack, a leading U.S. retailer of mobile and technology products, services and accessories, is working with IBM’s DemandTec cloud solutions designed to help chief marketing officers (CMO) and their teams improve price image and pricing operations throughout the entire pricing lifecycle’ (IBM 2012).

‘Virgin Atlantic Airways Ltd. engaged IBM Web analytics and strategic consulting services to better understand its customers’ online preferences and enable more precise marketing activities. Virgin Atlantic has been able to cater more effectively to customers and successfully evaluate and monitor site performance’ (IBM 2012).

In global and over-supplied markets, *chief customer officers* must deliver value to empowered customers through design, finding out who these customers are, what they want and how they would like to interact with the organisation in defining innovative product features. *Chief customer officers* must understand and deliver value to empowered customers; create lasting relationships with those customers; and measure marketing contribution to the business in relevant, quantifiable terms. Finally, *chief customer officers* must try to understand individuals as well as markets focusing on relationships, not just on transactions (IBM 2011).

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